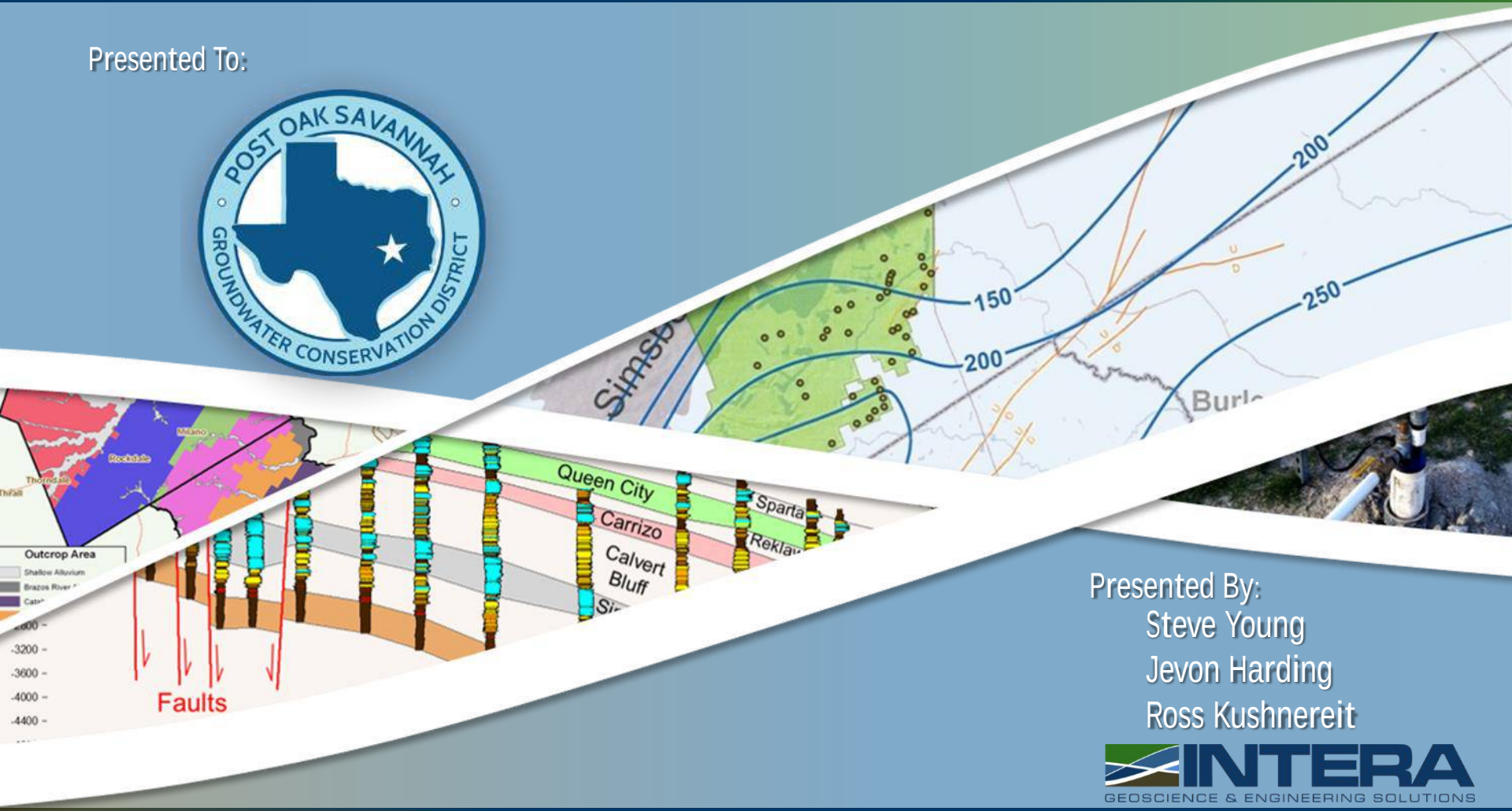
Presentation to DFC Committee: Evaluation of DFCs and PDLs and Demonstration of Compliance

Presented To:

POST OAK SAVANNAH GROUNDWATER CONSERVATION DISTRICT



Presented By:

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Ross Kushnereit

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May 9, 2020

Agenda

- GWAP Annual Needs Assessment Report
  - Summary
  - INTERA Comments on GWAP

- GMA 12 DFCs
  - Review PS-7 GAM Simulation
  - Discuss of DFCs
    - Possible adjustments to DFCs and MAGs
    - Possible modifications to PS-7 GAM Simulation
- Reports
  - Correction Action Report
  - Management Action Report

GWAP Annal Needs Assessment Report

GANA Findings

GAMs were used to predict the water levels from 2018 to 2028 at 981 wells that have values for pump depths in the POSGCD database. Out of the 981 wells, 151 wells were considered a priority because the simulated 2028 water level is lower than the elevation of the pump setting. The 981 wells and the 151 wells are comprised of the following:

- 114 Sparta wells were modeled, 1 well is considered to be a priority
- 121 Queen City wells were modeled, 3 wells are considered to be a priority
- 75 Carrizo wells were modeled, 17 wells are considered to be a priority
- 162 Calvert Bluff wells were modeled, 3 wells are considered to be a priority
- 52 Simsboro wells were modeled, 9 wells are considered to be a priority
- 134 Simsboro wells were modeled, 2 wells are considered to be a priority
- 322 Yegua-Jackson wells were modeled, 116 wells are considered to be a priority

GANA Findings (con't)

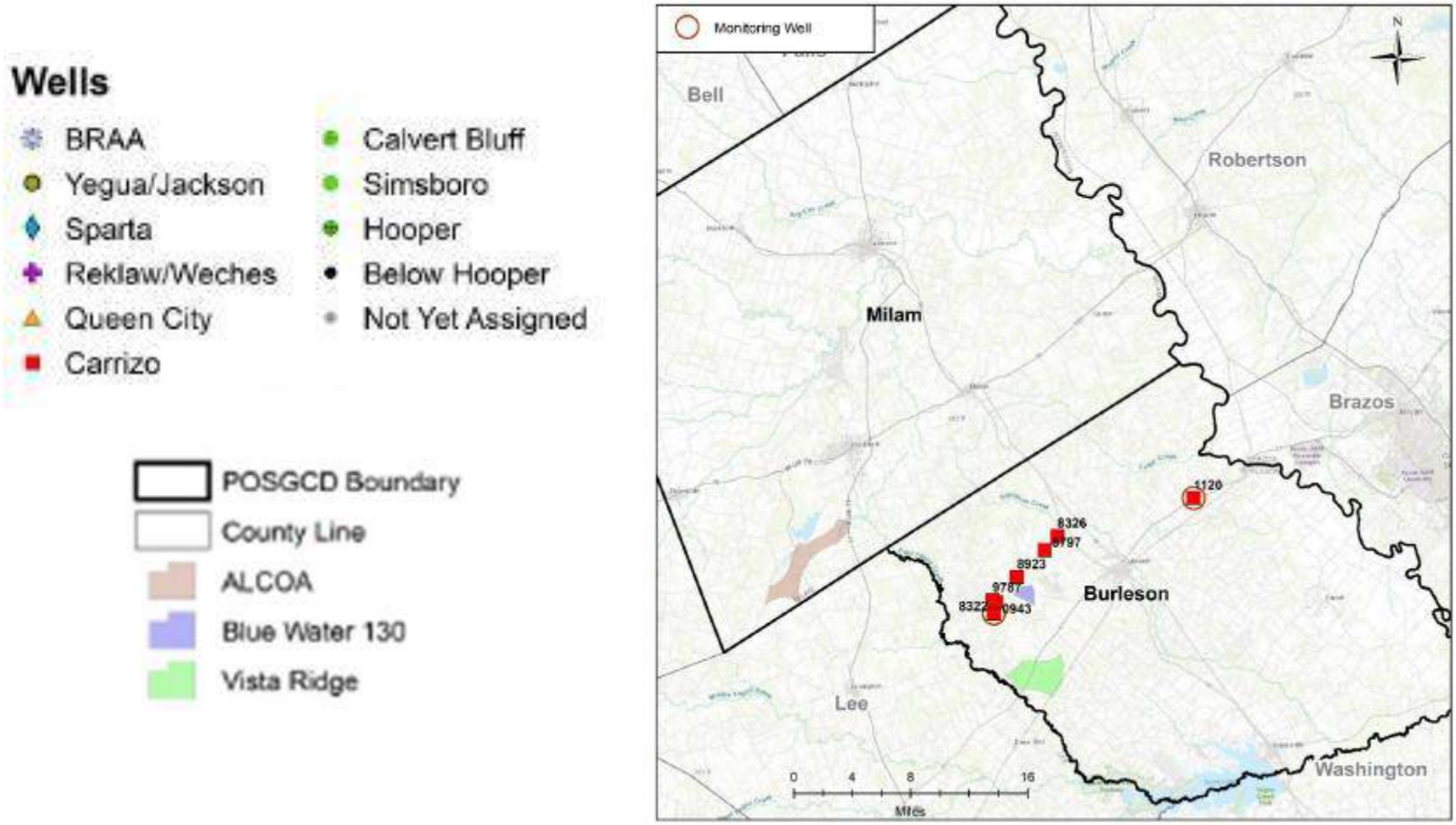


Figure 13. Seven wells that are designed as high priority wells based on a groundwater GAM simulations indicating simulated water levels in 2028 declining below the elevation of the pump setting and an evaluation of the reliability of the GAM simulated water levels and the elevation of the pump setting.

Comments Related To GANA Report

- Section 2: Purpose
  - cost-sharing
  - “no-fault” policy
- Section 3: Annual Assessment
  - define “any well” and “qualified well”
  - use of all GAMs and versions of GAMs
  - intend of “estimate the year any well may require assistance”
  - define “as soon as possible”

Comments Related To GANA Report

- Section 4: Corrective Actions
  - meaning of “pump being set at a depth that will exceed the 50-year water level decline”
  - what degree should water quality be considered when setting pump elevations
- Section 5: Funding
  - define “qualified well” for which District will cover all costs”
  - limit for program expenses
  -

Comments Related To GANA Report

- Section 6: Administration
  - responsible party for conducting the investigation
  - components the comprise an investigation and evaluation
  - requirements for well owner to apply for well assistance
  - meaning of “aquifer-wide” pumping
- Section 7: Eligibility
  - accurate well log required
  - who has responsibility for accurate well construction specification

GMA 12 Desired Future Conditions

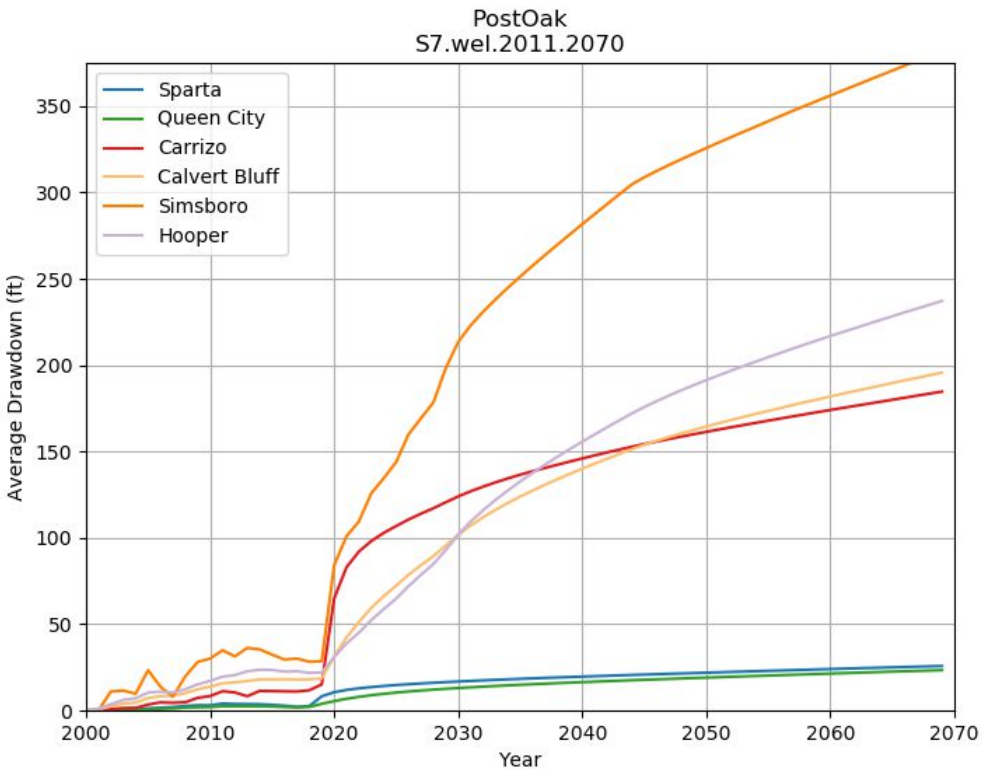
Simulated DFC for PS-7

Comparison of PS-7 Simulated DFCs and POSGCD DFCs*

Aquifer	Current DFC (feet)	Current MAG in 2070	PS-7 Drawdown from 2010 to 2070 (feet)	PS-7 Pumpage in 2070 (acre-feet)
Sparta	28	6,735	17	1,983
Queen City	30	504	19	1,045
Carrizo	67	7,058	177	18,205
Calvert Bluff	149	1,036	183	4,761
Simsboro	318	48,503	355	85,855
Hooper	205	4,422	222	3,126

* From GMA 12 Sept 2019 presentation (note: different time periods for PS-7 and POSGCD DFCs)

PS-7 Simulation



PS-7 Simulated DFCs for POSGCD

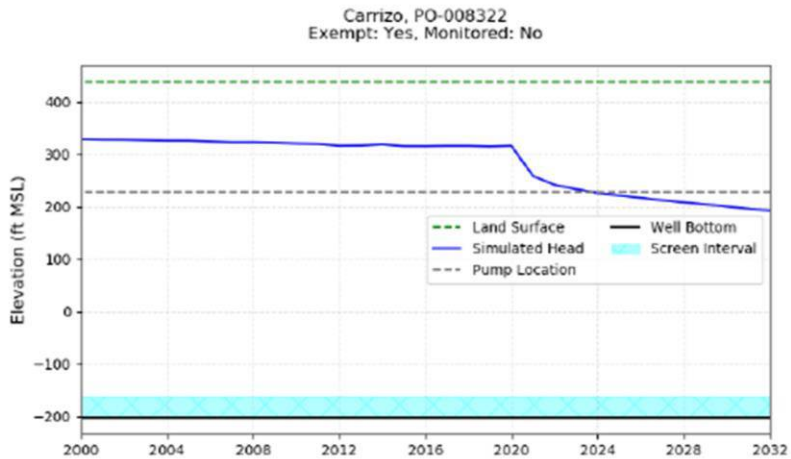
Aquifer	Current DFC (feet)	PS-7 Drawdown from 2010 to 2070 (feet)	Options for Achieving Maintaining POSGCD with PS-7 and without modifying Pumping in other GCDs
Sparta	28	17	• Increase pumping to permit amount ~ 3,000 AFY • Increase pumping to include exempt pumping
Queen City	30	19	• Increase pumping to include exempt pumping
Carrizo	67	177	• 10% Uncertainty with GAM Prediction • 10% Uncertainty with GAM Prediction
Calvert Bluff	149	183	• Improve GAM Representation of Simsboro Transmissivity • 10% Uncertainty with GAM Prediction (18 ft)
Simsboro	318	355	• Improve GAM Representation of Simsboro Transmissivity
Hooper	205	222	• Improve GAM Representation of Simsboro Transmissivity • 10% Uncertainty with GAM Prediction (22 ft)

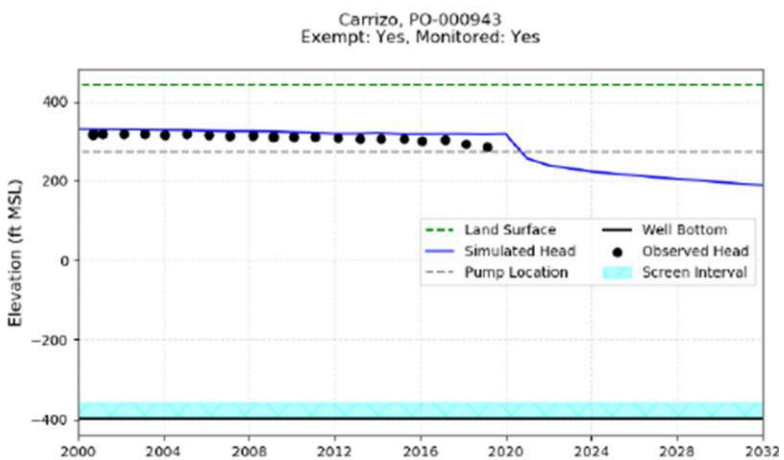
Considerations for Establishing Appropriate DFC & MAG for Carrizo Pumping

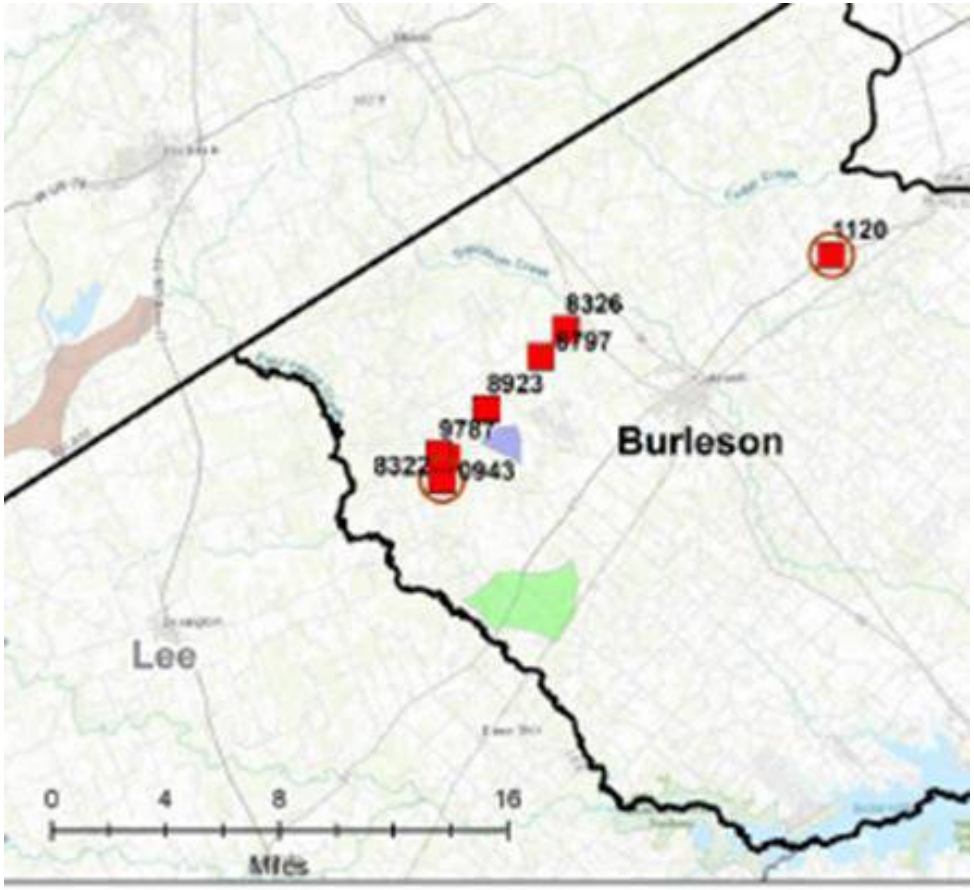
- Results from GANA
- On-going Fair Share Evaluations
- Hydrogeologic Assessment

Results From GANA

GANA Perform Using PS-9







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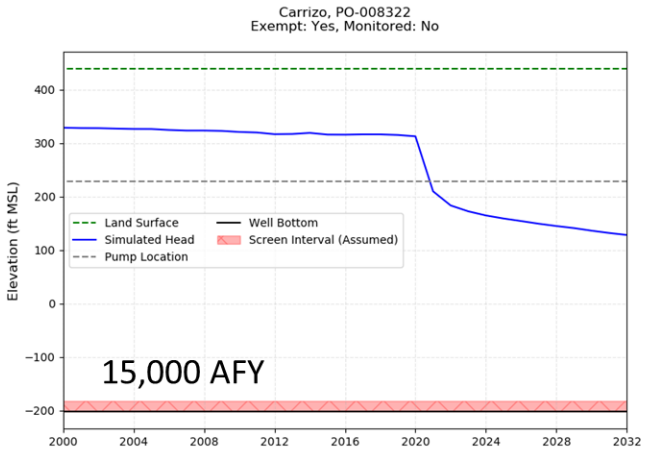
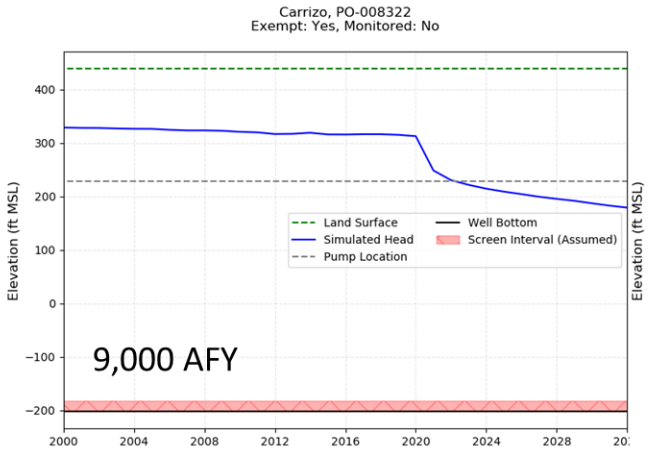
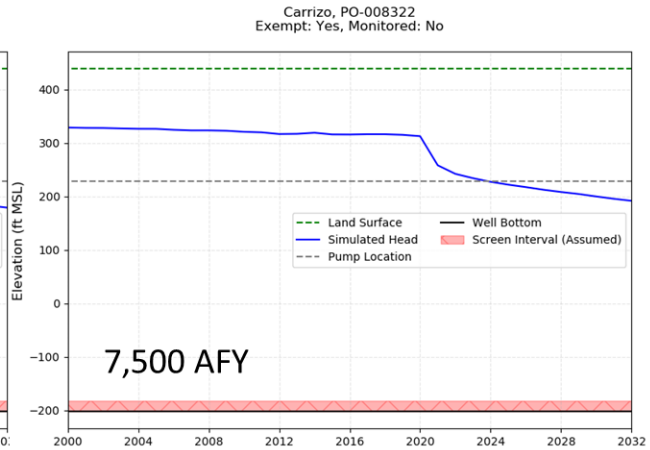
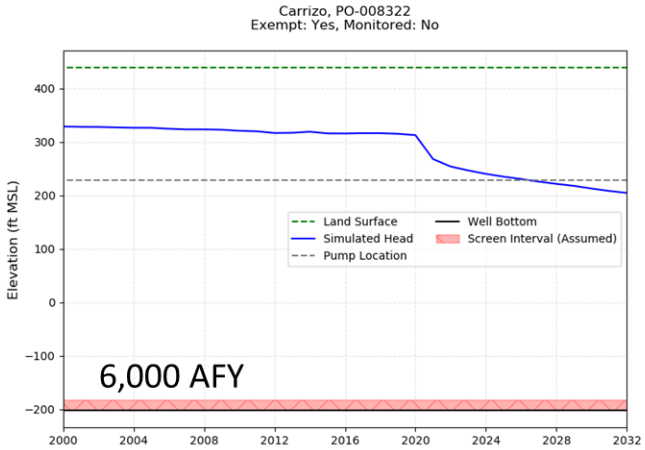
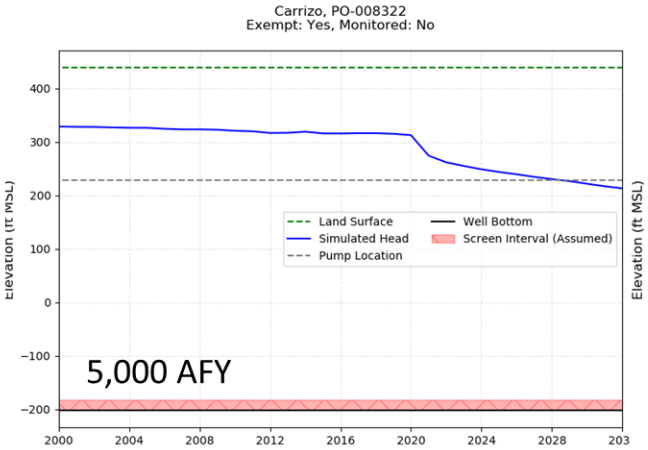
PO-8322 Hydrograph using Modified PS-7

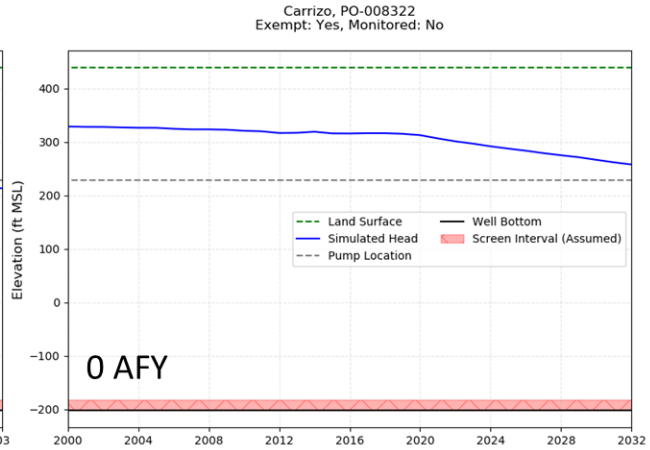












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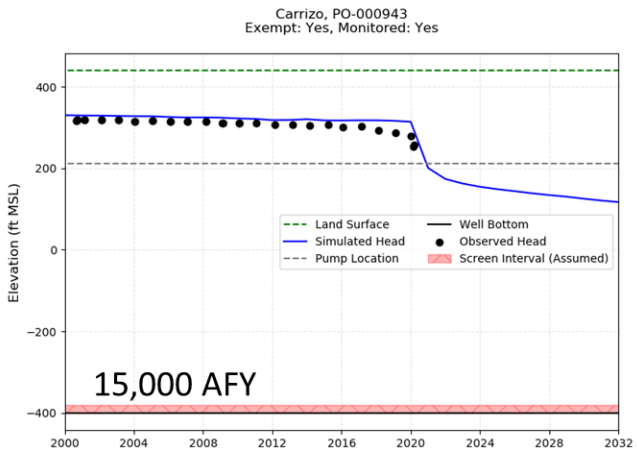
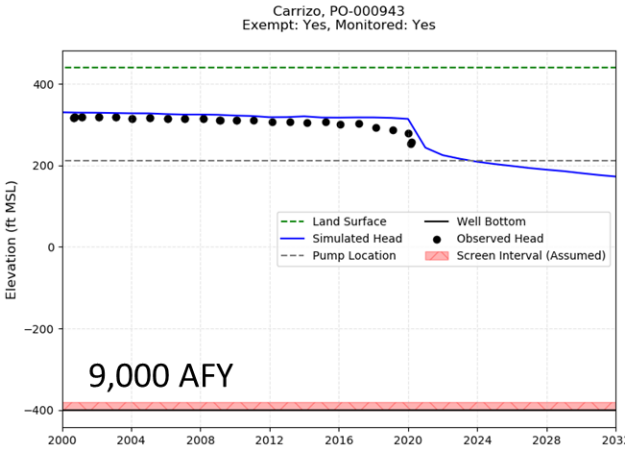
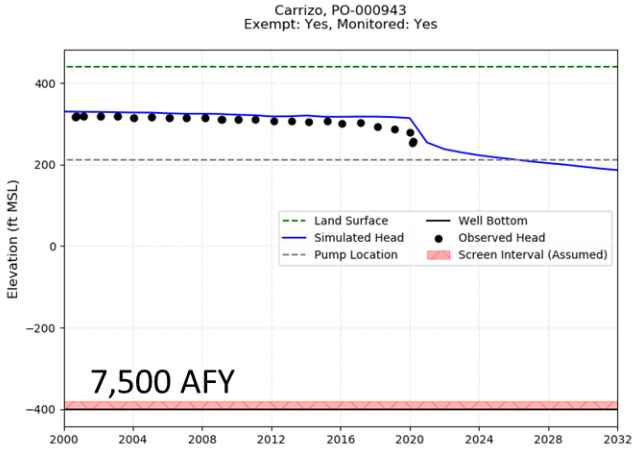
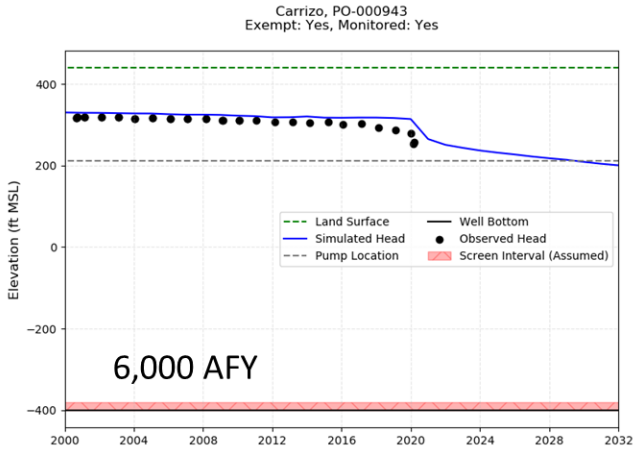
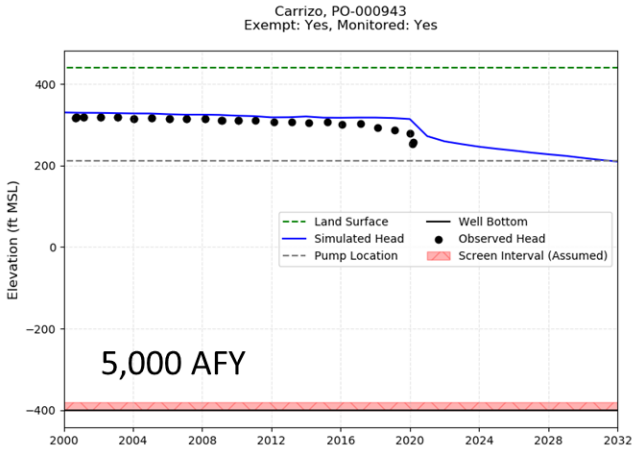
PO-0943 Hydrograph using Modified PS-7

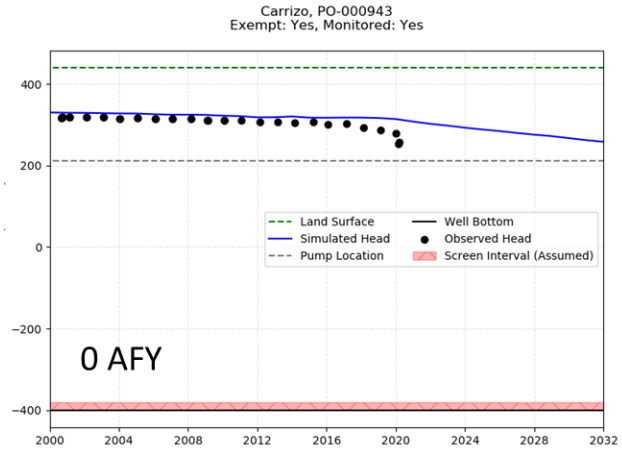




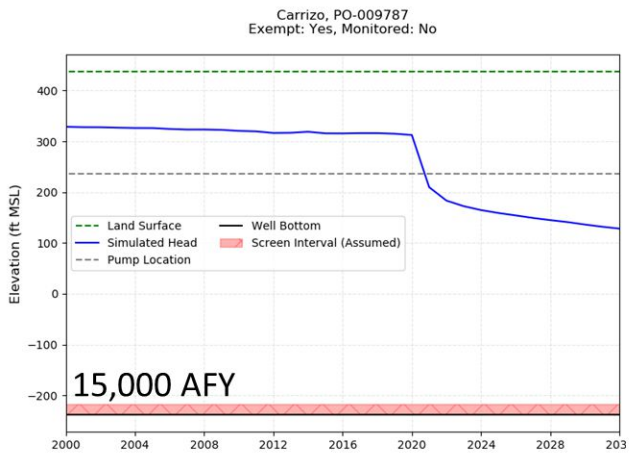


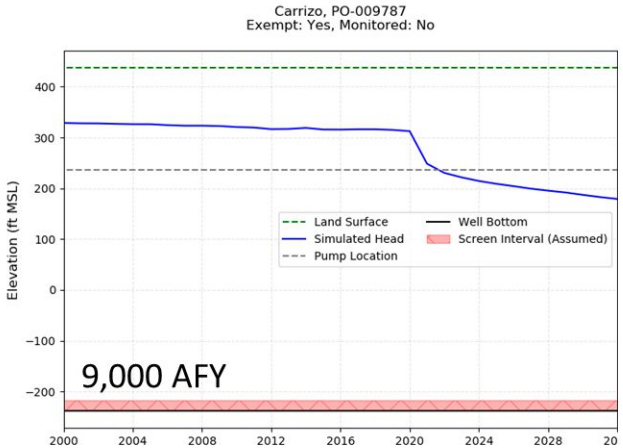


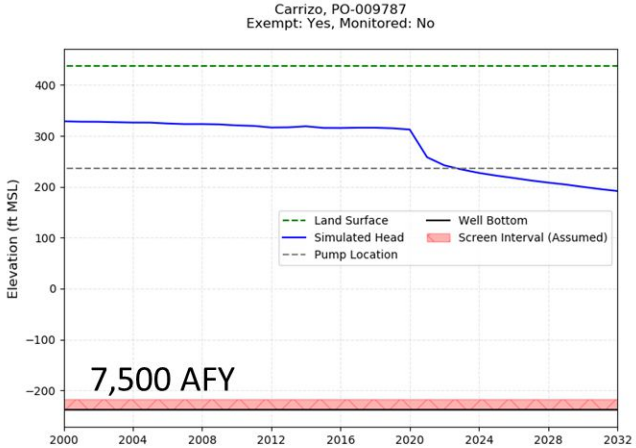


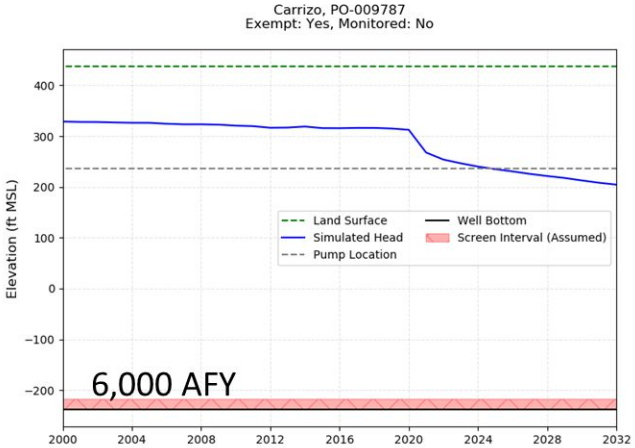


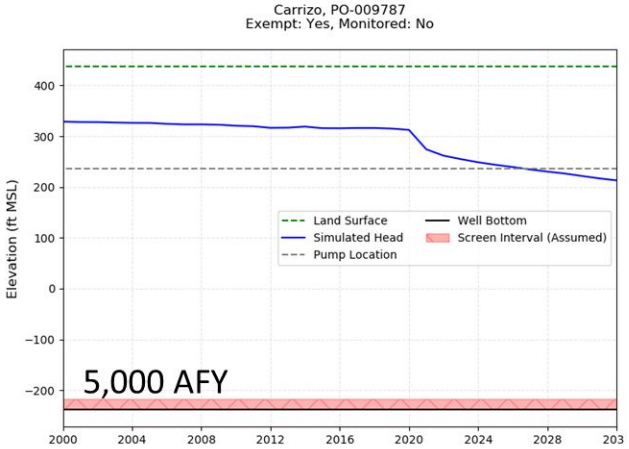
PO-9787 Hydrograph using Modified PS-7

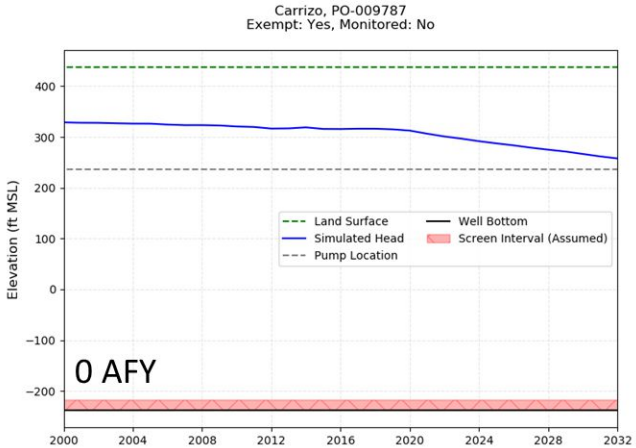












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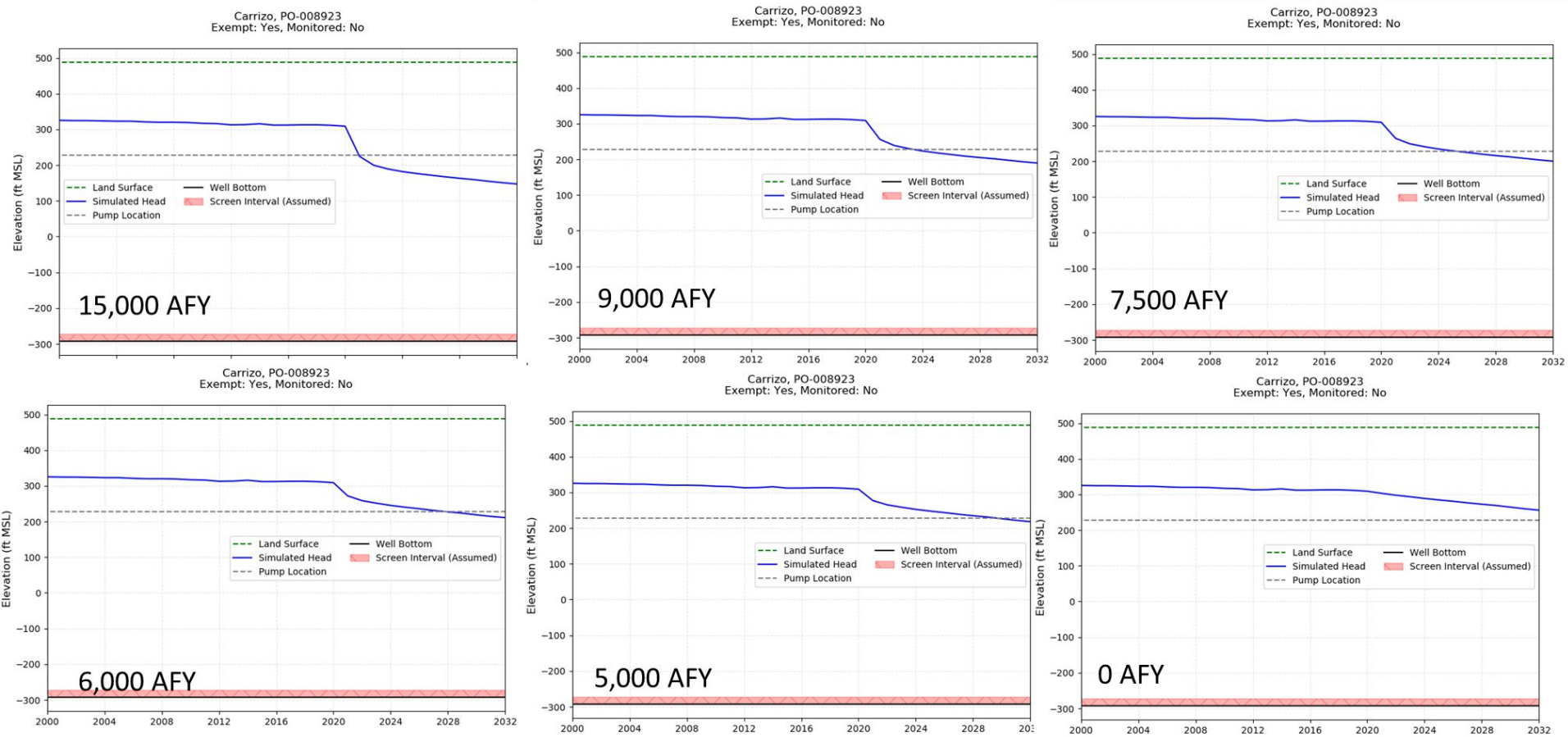
PO-8923 Hydrograph using Modified PS-7



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DFC For Modified PS-7 Runs

Vista Ridge Pumping (AFY)	DFC (2010 - 2070)		
	Carrizo	Calvert Bluff	Simsboro
0	105	157	347
5,000	127	165	349
6,000	132	166	349
7,500	139	169	349
9,000	145	171	350
15,000	172	181	351

PS-7 has 3,200 AFY of pumping in Carrizo Aquifer that is not associated with Vista Ridge

Possible Considerations for Limiting Maximum Production Rate per Acre

Possible Considerations

- Production Capacity
- Storage Capacity
- Depth/outcrop
- Water Quality

Differences Among Aquifers

Storage

Aquifer(s)	Volume in Storage (10^6 AF)	Area (sq miles)	% Total Storage
Upper Trinity	86	807	19.0%
Lower Trinity*	78	807	17.3%
Sparta	16	576	3.5%
Queen City	30	753	6.6%
Carrizo	29	835	6.4%
Calvert Bluff	63	1024	13.9%
Simsboro	53	1132	11.7%
Hooper	55	1237	12.2%
subtotal	200	4229	44.2%
Yegua-Jackson	42	291	9.3%
total	452**		100.0%

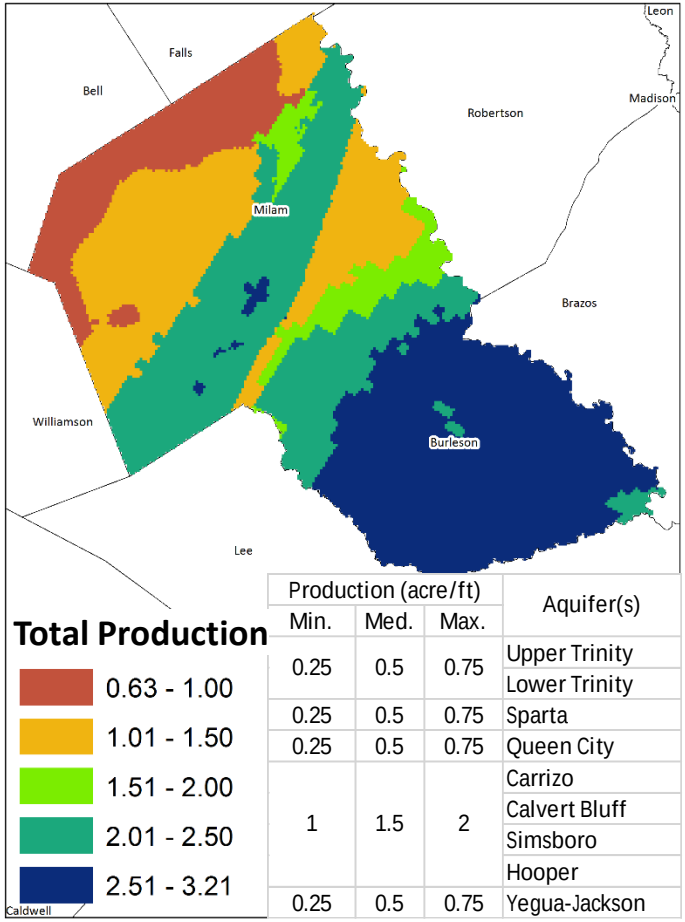
*Hensell, Pearsall, & Hossten

** equivalent of 415 feet of water above the district

Transmissivity

Aquifer(s)	% Production Capacity	Area (sq miles)	Average Trans. (ft^2/day)
Upper Trinity	0.8%	807	211
Lower Trinity*	6.6%	807	591
Sparta	1.4%	576	532
Queen City	2.1%	753	608
Carrizo	12.7%	835	3,311
Calvert Bluff	10.9%	1024	2,322
Simsboro	46.1%	1132	8,874
Hooper	18.2%	1237	3,207
subtotal	88.0%	4229	4,530
Yegua-Jackson	1.1%	291	847
total	100.0%	7464	

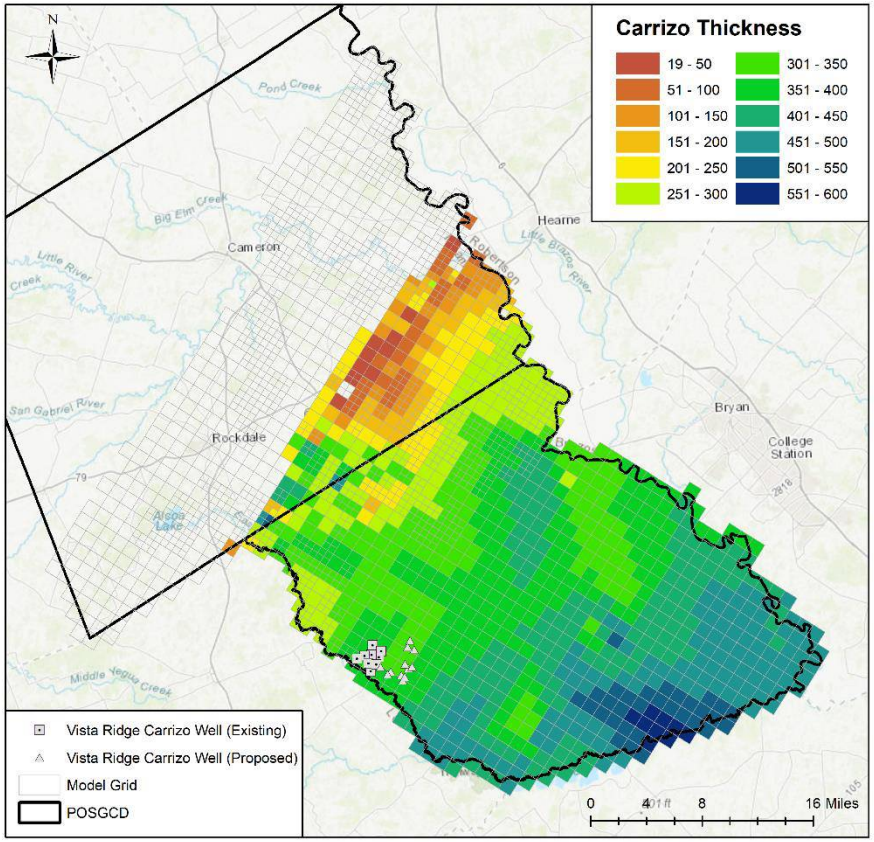
*Hensell, Pearsall

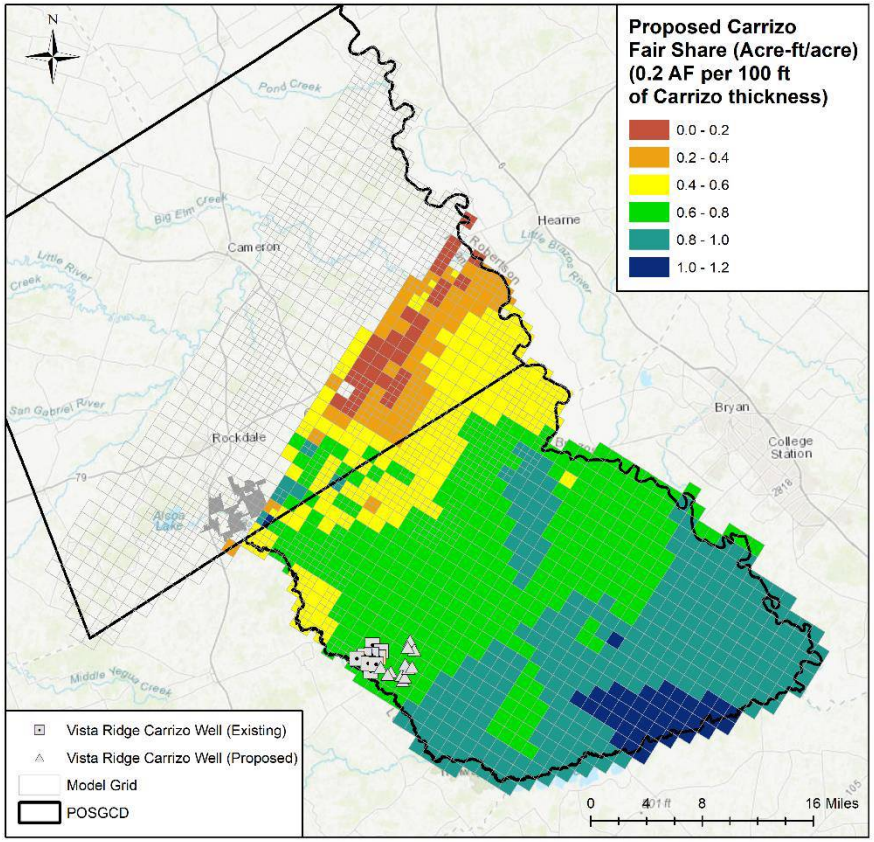


Production (acre/ft) Min.	Med.	Max.	Aquifer(s)
0.25	0.5	0.75	Upper Trinity
			Lower Trinity
0.25	0.5	0.75	Sparta
0.25	0.5	0.75	Queen City
1	1.5	2	Carrizo
			Calvert Bluff
			Simsboro
			Hooper
0.25	0.5	0.75	Yegua-Jackson

* Tabular data presented to DFC committee on March 9, 2017

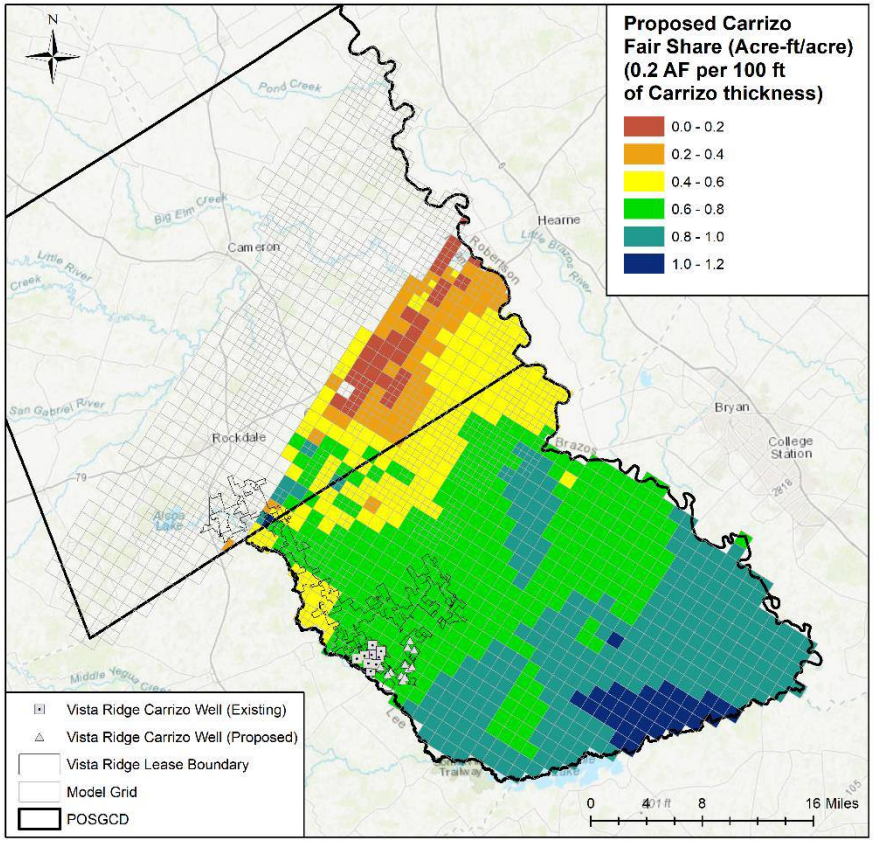
Fair Share: Example Calculation for Carrizo

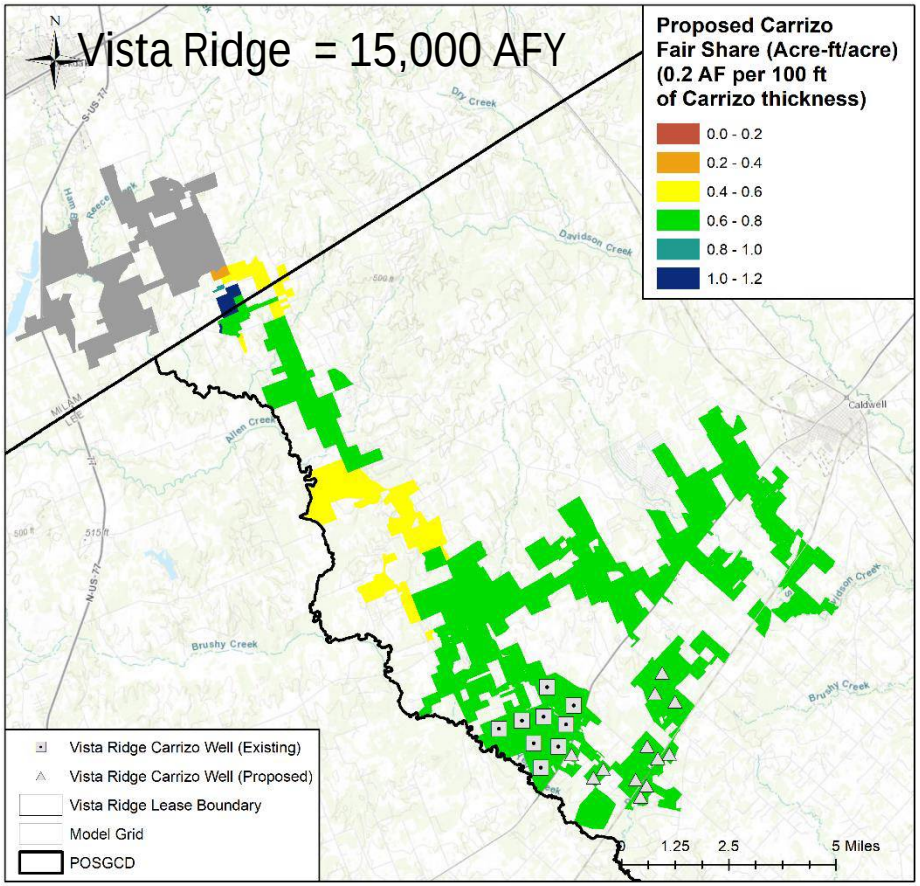




- Total acreage – 530, 882 acres (830 sq miles)
- Total AFY = 371,952 based on 0.2 AF per 100 ft

Fair Share: Example Calculation for Carrizo and Vista Ridge Leases*

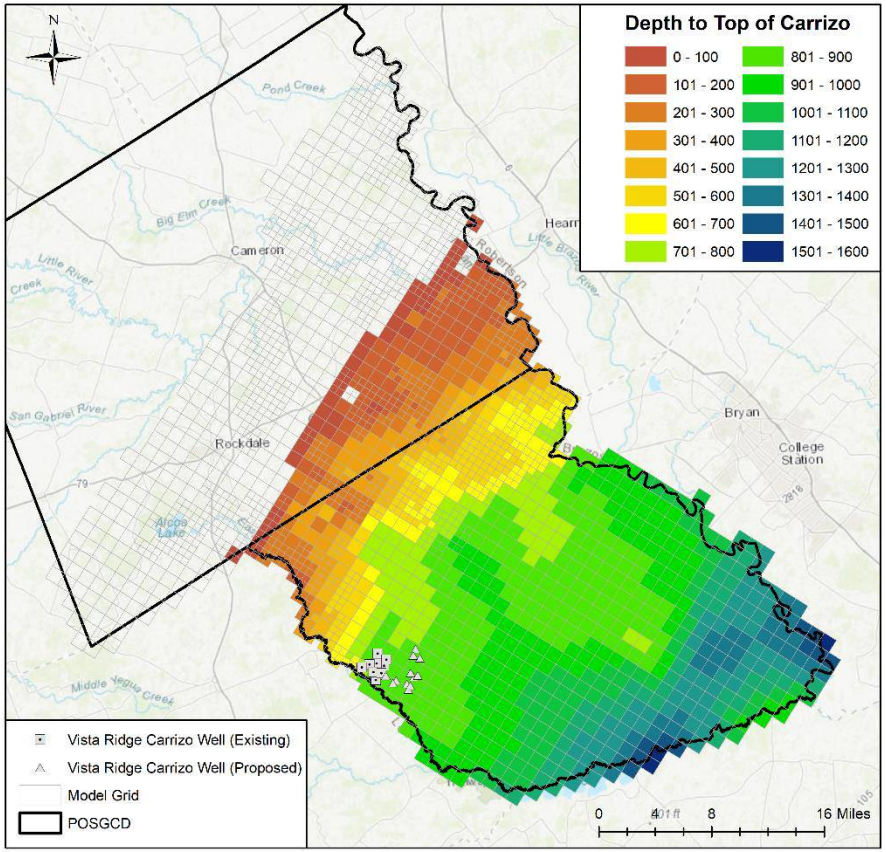


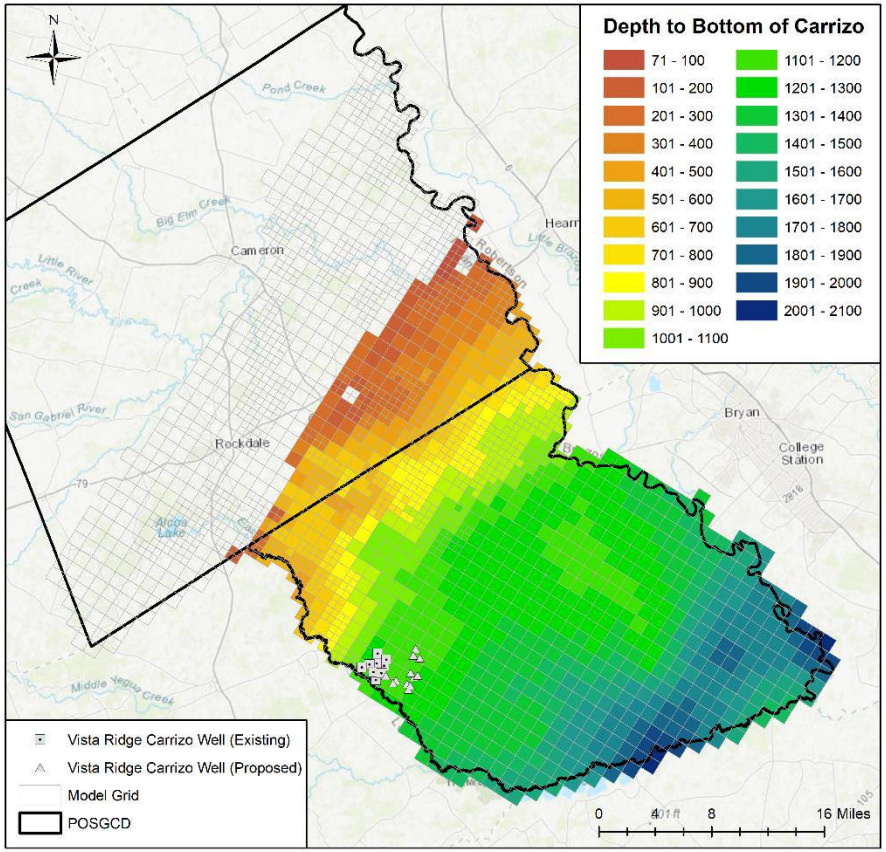


Vista Ridge Acreage = 27,705 acres
Vista Ridge Acreage (Carrizo) = 22,257 acres

* Approximate calculations and lease info is approximate

Fair Share: Additional Considerations





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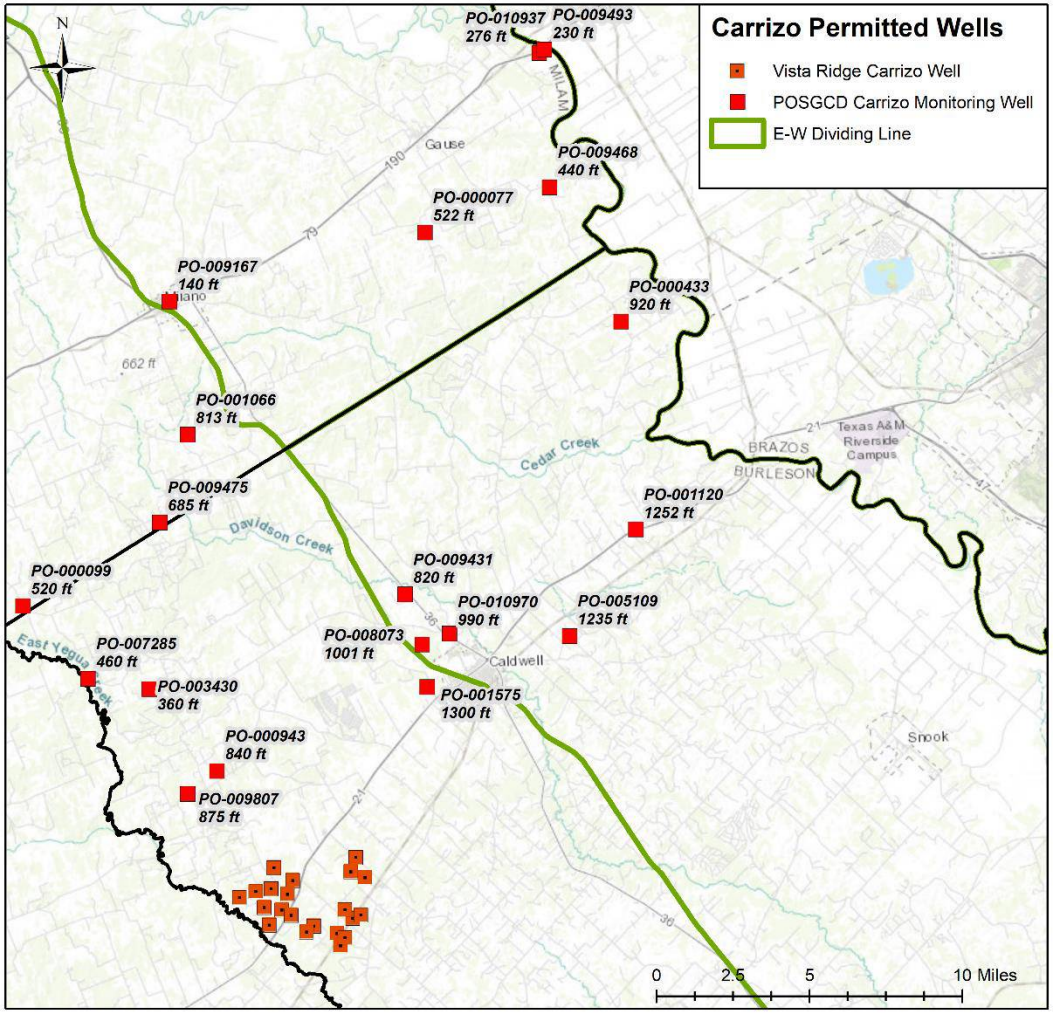
Fair Share: Additional Considerations



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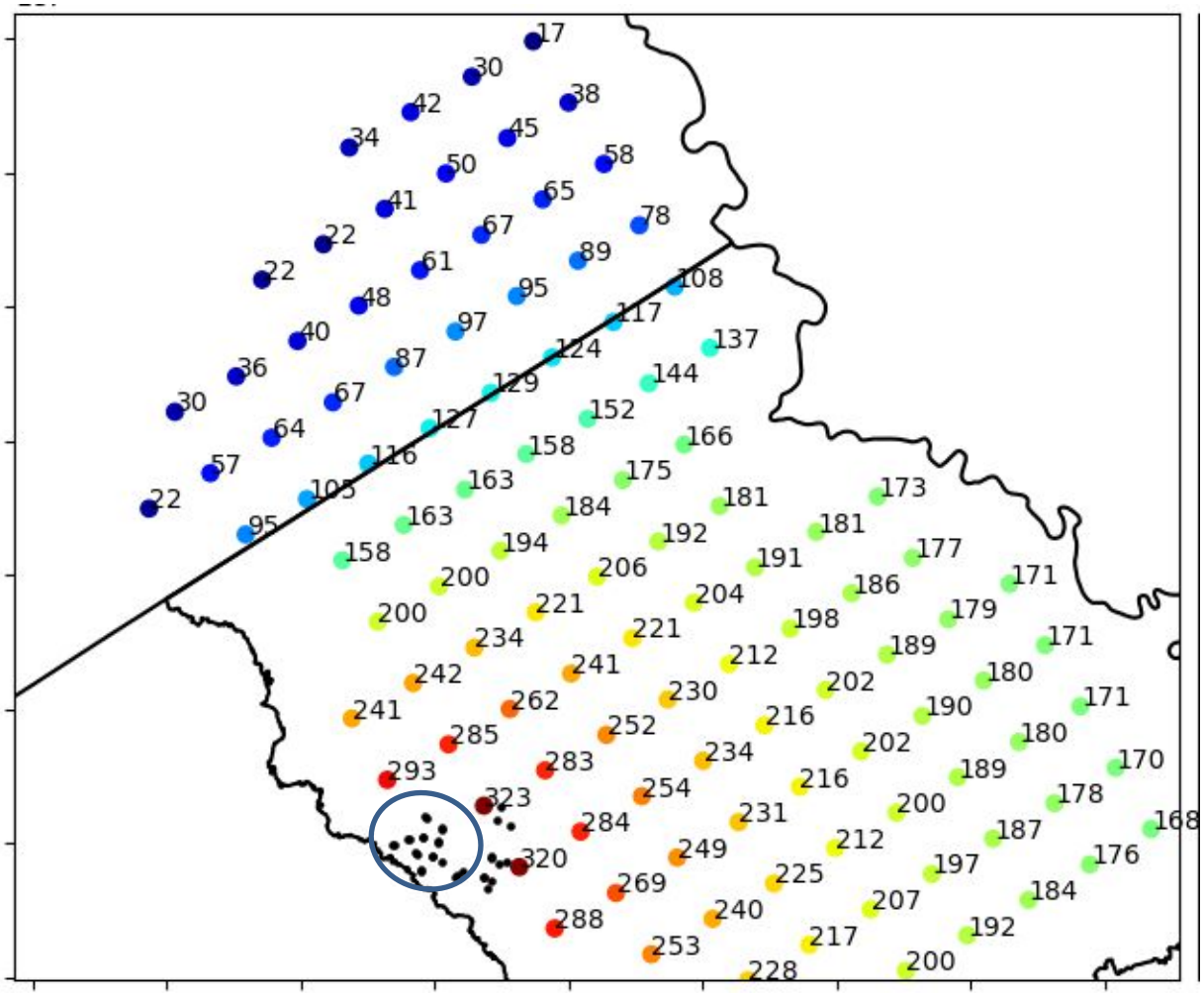
Possible Considerations for Hydrogeologic Assessment

- Each point represents average drawdown for an area of 20 square miles
- Inside blue oval, average drawdown is twice the DFC value of 173



Reports

Reports

GANA Report
Groundwater Assistance Program Annual Needs Assessment

Objective: Evaluate the potential of *water wells* going "dry" based on *simulated water levels* from GMA 12 DFC simulations

CR Report
Evaluation of Compliance Goals Based on Monitored Water Levels

Objective: Evaluate compliance to *DFC's and PDL's* based on interpretation of *measured water levels*

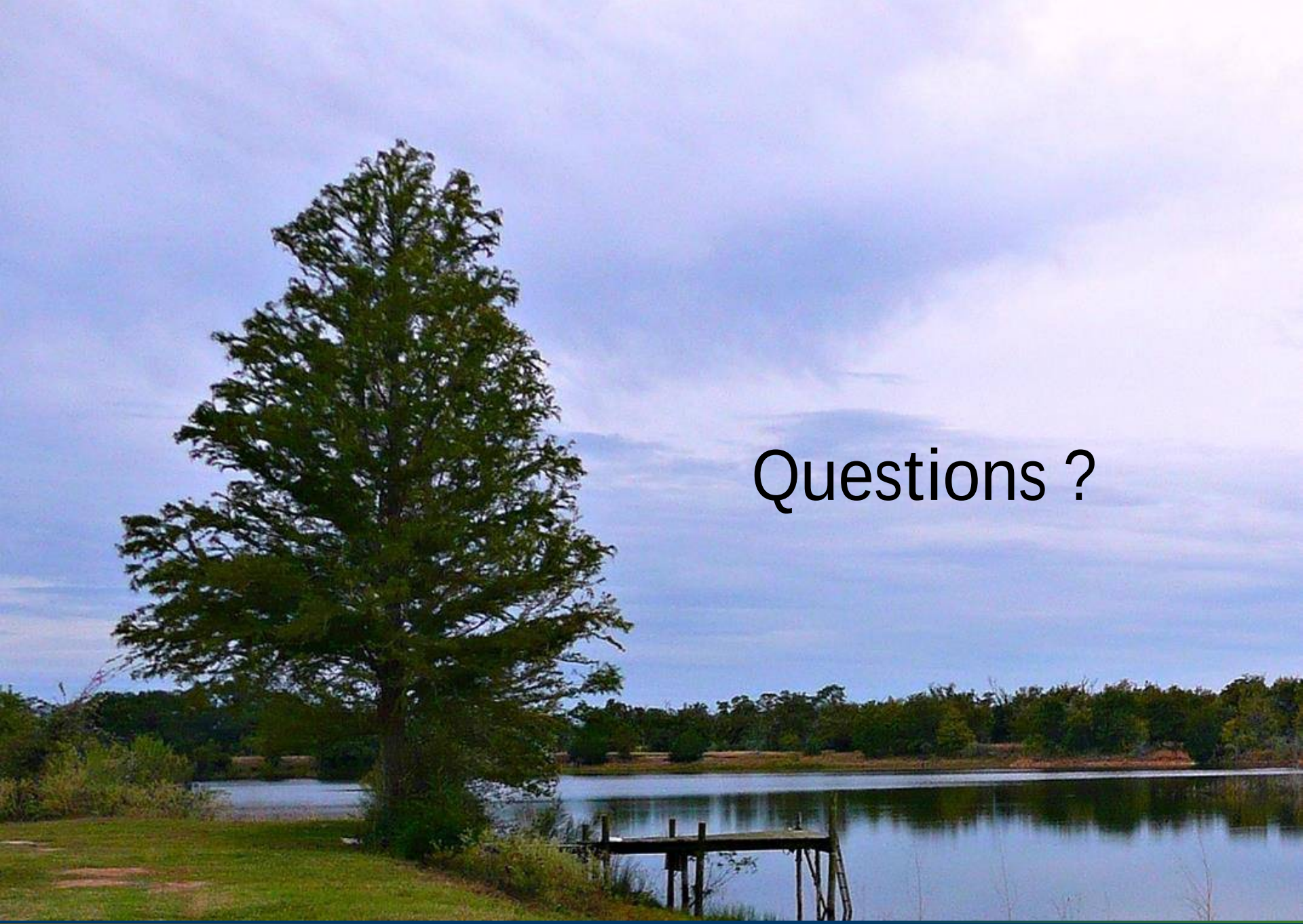
MS Report
Assessment of Management Strategies for Water Availability and Production

Objective: Using best science to:
1) predict year that Rule 16 thresholds may occur
2) evaluate timing for production cutbacks to achieve management goals
3) assess the need for adjusting maximum allowable production of 2 ac-ft/ac
4) assess effectiveness of current management strategies for achieving management goals
5) identify possible changes in management strategies to help achieve management goals

GANA = Groundwater Assistance Program Annual Needs Assessment
CR = Compliance Report
MS = Management Strategies

Corrective Action Report

- Document work associated with evaluating compliance
- Check on Monitoring Wells
- Check on Interpolation Method
  - Evaluation of geostatistical analysis
  - Evaluate feasibility for using averages of selected wells
- Recommendations
  - Monitoring well network
  - Interpolation Method
  - Use of Indicator wells



Questions ?